

**NEW INITIATIVE**

P.E.: 6XXXX TITLE: SPIKE

RD&E RESOURCES (\$ in Millions)

	<u>FY 73</u>	<u>FY 74</u>	<u>FY 75</u>
Required Funding	10.2	21.8	4.0

PURPOSE AND DESCRIPTION

SPIKE is an air-launched anti-satellite system concept based on the use of F-106 interceptors equipped with modified Standard ARM type missiles. Its objective is to achieve a near-term satellite intercept capability with small modifications to existing hardware. The plan includes modification of the interceptor missile with a small second stage. The final stage would

REQUIREMENT

ADC ROC S-71 defines a requirement for an anti-satellite weapon system. This system provides a near-term capability to meet a portion of those requirements.

BENEFITS

SPIKE will provide a low cost, quick response capability for interception of satellites prior to first overflight of CONUS from existing F-106 bases. This can be accomplished with minimum modifications to the aircraft and no reduction in its ability to perform other missions. The intercepter would be capable of

## INTRODUCTION

The primary purpose of this study is to define a demonstration program for [redacted] kill of satellites in the lower altitude regimes, using an interceptor launched from an aircraft platform and incorporating a [redacted]. The specific objective of this study is to place the United States in a posture to acquire a system [redacted] kill of alien satellites with minimum delay or technical risk should such a system be found necessary. The study shall also document the state-of-the-art in applicable technology areas, and shall delineate program plans for the development of a test bed flight demonstration program and for the development of an operational capability. Background information documentation giving pertinent information relating to target models and scenarios and DOD related component technology programs and candidate aircraft and ground and support systems will be made available to the contractors,

### B. SCOPE

This study will include engineering studies, simulations, and tests for the analysis, selection, and synthesis of a flight demonstration system and identification of a preferred operational system, and the documentation thereof. The study shall make maximum use of the data and the results of any past analytical or experimental investigations that are pertinent. The demonstration system and program shall be designed to substantiate the capability to implement the operational system.

The required effort is divided into five specific tasks.

1. Determine a preferred operational system
2. Define the demonstration system
3. Conduct simulations and laboratory tests
4. Describe test targets
5. Generate demonstration program plans

Feasibility studies have defined a baseline demonstration concept which is described in detail in Annex \_\_\_ of this SSOW. Briefly, this concept is as follows.

1. Use of the F-106A or F-106B aircraft as the launch platform.
2. Use of a modified Standard Anti-Radar Missile (AGM-78).
3. \_\_\_\_\_
4. \_\_\_\_\_
5. --- Flight demonstration at the Eglin/Tyndall AFB complex.
6. Instrumented targets for performance evaluation.

The preferred operational system analysis in Task 1 will consider this baseline concept but will not be constrained by it and will make any changes which improve operational capability. The demonstration, to be defined in Task 2, will be derived from this baseline concept. Changes to the baseline may be made where necessary but each change shall be justified by the contractor. Modification of existing subsystems shall be minimized.

(U) Any promising new system, subsystem, or component concepts shall be investigated. Prior or current developmental efforts shall be reviewed to be sure that no such concepts are overlooked.

~~(S)~~ The contractor shall prepare a written summary report covering all work done, with associated tradeoffs, computer and experimental simulation results, and program plans leading to the development and test of the demonstration system(s).

### C. GENERAL BACKGROUND

~~(S)~~ Recent satellite negation studies (1971) sponsored by the Aerospace Defense Command (Ref. 1) and by SAMSO/Aerospace Corporation (Ref. 2) have indicated the technical feasibility of an air launched system which could be developed and flight tested.

The homing vehicle continues to be an area of development uncertainty for a near term application. The impact of recent advances in technology on homing vehicle capabilities have not been fully evaluated. In-depth studies and analyses are required to define (a) aircraft launched interceptor system and homing vehicle requirements and capabilities, (b) a near term homing vehicle flight test based on current and/or projected technological advancements, (c) the criteria and requirements for a meaningful flight demonstration program, and (d) performance of aircraft launched systems and their growth potential (at least in the area of photo inspection).

#### D. TASKS

##### Task 1 Operational System Studies

The purpose of this task is to conduct system synthesis studies leading to selection of a preferred system or alternatives for operational deployment of an aircraft launched satellite interceptor incorporating a

This effort will be done in close coordination with Hq. CONAD. The study and analysis will include but not be limited to (1) tradeoffs of CONUS and overseas basing (including logistics) for time critical intercepts and adequate coverage of the general and specific threats, (2) the evaluation and analysis of current and projected inventory candidate aircraft systems and selection of the preferred aircraft, (3) interceptor design, (4) performance evaluation comparison of aircraft and surface launched systems for the general and specific threat scenarios and system growth potential studies, (5) design, with emphasis on the homing vehicle and dispenser, of the preferred system and alternatives (including adequate design of the THV and preliminary design of the system), and (7) requirement for displays and functional interfaces with the mission control(s) and aircraft pilots.

The contractor shall describe (1) the preferred mode of intercept and negation for each target and the corresponding requirements on the system and subsystems; (2) the system physical, technical, and performance characteristics and descriptions of candidate ground, support, and vehicle systems and subsystems and alternatives; (3) the

requirements for kill assessment; (5) negation effectiveness for specific targets; (6) with Hq. CONAD the number, basing, and logistics of aircraft and interceptors required for adequate threat coverage; (7) the criteria for system and subsystem selections after considering alternatives; (8) the mission profile and time lines analysis covering all operations performed in carrying out the intercept and negation; (9) reliability and performance; (10) development and operational costs; and (12) development, deployment and operation programs, plans, schedules, and costs.

#### Task 2 Test Bed System Definition

The purpose of this task is to define the system requirements, conduct systems analysis and design, and to synthesize an interceptor system for an early (FY 74-75) test bed flight demonstration of an aircraft launched interceptor. System performance shall be adequate to provide

To be provided in Annex \_\_\_\_\_.

The contractor shall determine for a generalized threat and specific threat scenarios provided by SAMSO: (1) the preferred mode of intercept and negation for each target and the corresponding requirements on the system and subsystems; (2) the system physical, technical, and performance

characteristics and descriptions of air defense ground, support, and vehicle systems and subsystems and alternatives; (3) system vulnerability and the [redacted] (4) diagnostic requirements for scoring and damage assessment; (5) negation effectiveness for specific targets; (6) the number, basing, and logistics of aircraft required for the demonstration program; (7) the criteria and rationale for system and subsystem selections after considering alternatives; (8) the mission profile and timelines analysis covering all operations performed in carrying out the intercept and negation; (9) growth potential; (10) developmental costs; and (11) development programs, plans, schedules, and costs. Included will be system and subsystem preliminary design, detailed design of the [redacted] r, analysis of system reliability and safety and recommended reliability goals to achieve satisfactory mission performance including the reliability requirements for all critical components.

This effort shall also assess the applicability of the test bed system to an eventual operational capability, and to establish the appropriate roadmap(s) to achieve this capability.

### Task 3 Tests and Simulation

~~Task 3~~ The purpose of this task is to conduct simulation and limited laboratory tests to verify the credibility and accuracy of the engineering analyses. Tests shall cover the fundamental technological or development problem areas associated with target [redacted] and the deployment, dynamics, control, and performance of [redacted] vehicle, and the dynamics of aircraft interceptor storage and launch, both subsonic and supersonic (wind tunnel model tests).

### Task 4 Test Target Definition

~~Task 4~~ The purpose of this task is to define the test targets to be used in the demonstration program. The contractor shall select and define targets of increasing complexity and will define the diagnostic and sensor data required for scoring. Target selection shall include consideration of

Realistically simulating the characteristics of specific Soviet Union and Chinese Peoples' Republic satellites and to insure that compliance with the operational system requirements derived in Task 1 are adequately demonstrated. These scoring aids may be active or passive as appropriate. The contractor will also determine the method of acquisition and deployment of targets.

### Task 5 Program Recommendations and Plans

(U) The purpose of this task is to develop program plans for the development and test of the demonstration system. The program plan will include the development and procurement of all necessary items and subsystems. It shall include estimates on manpower, specific development goals, milestones, schedules, and costs. It shall include plans to ensure performance, reliability, and safety goals are achieved. Required concurrent or backup studies and/or technology and development programs for critical high risk items shall be identified and described as alternate roadmaps leading to the same objectives. A proposal statement of work for the development phase and a specification of system requirements for performance and design shall be provided.

### E. SCHEDULE AND MILEPOSTS

